

Please have your review guide finished by...._____

Guidelines for Semester 1 Physical Science Exam

1. Review packets are to be made available **Friday, November 21.**
 - a. Review guides may be posted online by teachers.
 - b. Students may print their own copy earlier.
 - c. You may begin going over the exam review **5 days prior** to your scheduled exam day.
 - d. Exam review guide answer documents **must** be posted on progress book after the review guide has been reviewed.
 - e. Students with (IEPs and 504-plans) may have their review guide modified by their IS.
2. All student items need to be stored at the front of the room/in one location during the administration of the exam.
 - a. Students are not to have any access to cell phones, iPods, and/or any electronic transmitting device during the Exam period.
 - i. Translators are permitted for ESL students.
3. A reference sheet with needed formulas and given constants will be provided and handed out with the exam.
 - a. This formula sheet may be posted ahead of time, so students can see what is provided for them on the test.
4. Calculators may be used.
 - a. No graphing calculators are allowed.
5. ONE 3 x 5 note card (front and back) may be used by students on the exam.
 - a. It must be handwritten
 - b. Students may use both sides of the card
 - c. The **FINAL** note card must be completed in class under teacher supervision.
 - i. For high school: in the review (class) period immediately before the exam.
 - d. This note card should never leave the room!
 - e. The note card will be collected by the teacher at the conclusion of the exam.
 - f. However, students with (IEPs and 504-plans) may complete their note card ahead of time with their IS.
6. The test **SHOULD** be completed in the 90 minute period.
 - a. However, students with (IEPs and 504-plans) may have extended time as needed to finish the exam during the same day.
 - b. ESL students are permitted to take their exam in their resource rooms.
7. This exam should not leave the building for any reason.
8. *Test corrections/modifications as dictated by student need (IEP) to be completed within the building under supervision of the intervention specialist or classroom teacher.*
 - a. A basic/district agreed upon modified exam will be provided to you from the district.
 - b. If further modifications are needed. They need to be added to the general modified exam.
9. **Test security should not be compromised. Questions from the exam should not be used for test or quiz purposes, or for review questions.**

High School Physical Science Reference Sheet

Equations:

$$\Delta x = x_f - x_i$$

$$v_{avg} = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$$

$$a_{avg} = \frac{\Delta v}{\Delta t} = \frac{v_f - v_i}{t_f - t_i}$$

$$F_{net} = ma$$

$$F_g = mg$$

$$E_k = \frac{1}{2} m v^2$$

$$E_g = mgh$$

$$W = F \Delta x$$

Constant:

$$g = 10 \text{ m/s}^2 = 10 \text{ N/kg}$$

Variables and Symbols:

Δ = change in a value (final – initial)

a = acceleration

a_{avg} = average acceleration

E_g = gravitational potential energy

E_k = kinetic energy

F_{net} = net force

F_g = gravitational force

g = gravitational field strength

h = height

m = mass

t = time

v = speed

v = velocity

v_{avg} = average velocity

W = work

x = position

PART 1-MOTION

Below are the motion learning targets that will be assessed on the semester one exam. Please identify your strengths & weaknesses in these areas so you can determine which areas you might need to review further.

1.1 Basic Motion

	<u>Assessment Statement</u>	I get it!	I need to review more
1.1.a	State that all motion depends on frame of reference.		
1.1.b	Define distance and displacement.		
1.1.c	Describe motion in terms of distance, displacement, position, speed, velocity, and acceleration.		

1.2 Motion maps and Graphing

	<u>Assessment Statement</u>	I get it!	I need to review more
1.2.a	Interpret and draw motion maps.		
1.2.b	Describe motion in terms of distance, displacement, position, speed, velocity, and acceleration.		
1.2.c	Recognize constant velocity, rest, and acceleration on position-time graphs.		
1.2.d	Determine average velocity by using slope on a position-time graph.		
1.2.e	Create a velocity-time graph using a position-time graph.		
1.2.f	Recognize constant acceleration, rest, and constant velocity on a velocity-time graph.		
1.2.g	Determine average acceleration by using slope on a velocity-time graph		

1.3 Velocity

	<u>Assessment Statement</u>	I get it!	I need to review more
1.3.a	Define velocity.		
1.3.b	Define and compare instantaneous and constant speed/velocity.		
1.3.c	Calculate Average Velocity as displacement over elapsed time.		
1.3.d	Describe the difference between a positive and negative velocity.		
1.3.e	Describe the difference between speed and velocity.		

1.4 Acceleration

	<u>Assessment Statement</u>	I get it!	I need to review more
1.4.a	Define acceleration.		
1.4.b	Calculate average acceleration as change in velocity over elapsed time.		
1.4.c	Describe the difference between a positive and negative acceleration.		
1.4.d	Describe that zero acceleration can represent standing still OR moving at constant velocity.		

1. Define/provide examples of/provide conditions for/describe applications of the following:
Frame of Reference -

Position -

Distance -


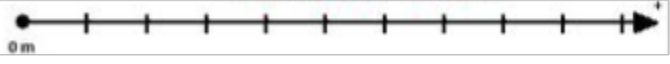

Displacement -

Speed (w/ units) -

Velocity (w/ units) -

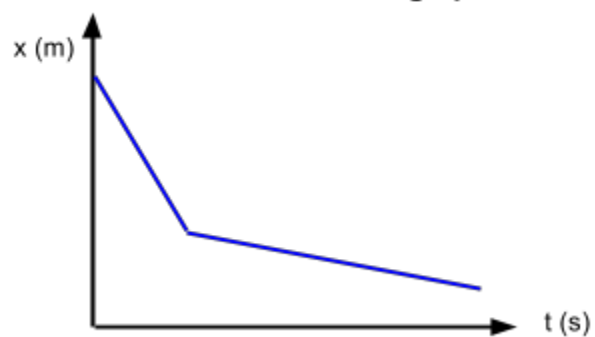
Acceleration (w/ units) -

2. Given the information, complete the other representations for the given's motion.

<p>Written Description of motion:</p> <p><i>Object moves a constant velocity in the positive direction (away), the stops moving for a few seconds.</i></p>	<p>Position vs. Time graph:</p>  <p>A coordinate system for a Position vs. Time graph. The vertical axis is labeled $x \text{ (m)}$ and the horizontal axis is labeled $t \text{ (s)}$. Both axes have arrows at their ends.</p>
<p>Motion Map:</p>  <p>A motion map diagram showing a horizontal axis with a starting point marked by a dot and labeled "0 m". There are 11 tick marks along the axis, and an arrow at the right end pointing in the positive direction.</p>	<p>Velocity vs. Time graph:</p>  <p>A coordinate system for a Velocity vs. Time graph. The vertical axis is labeled $v \text{ (m/s)}$ and the horizontal axis is labeled $t \text{ (s)}$. Both axes have arrows at their ends.</p>

Written Description of motion:

Position vs. Time graph:



Motion Map:

Velocity vs. Time graph:



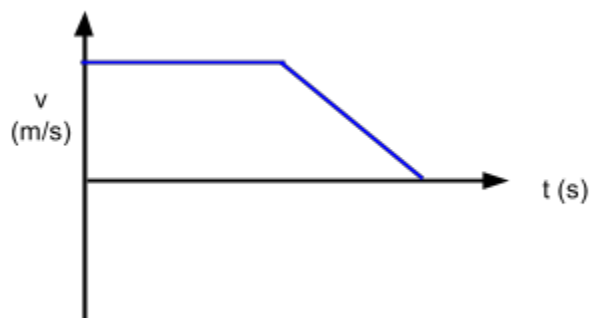
Written Description of motion:

Position vs. Time graph:

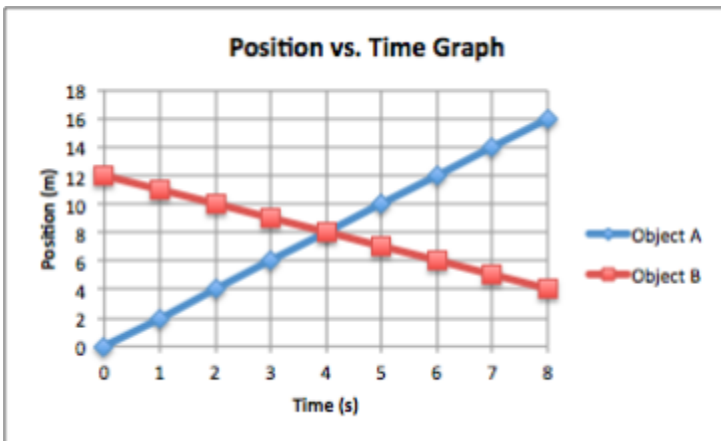


Motion Map:

Velocity vs. Time graph:



3. Given the Position vs. Time graph answer the following questions.

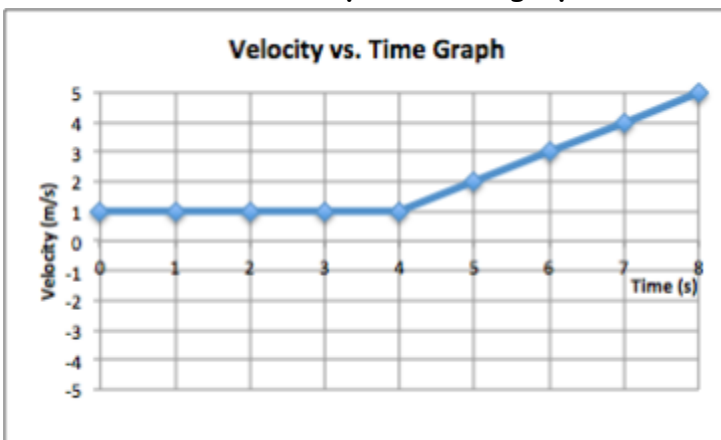


Which object had the greater displacement?
Explain.

What are the velocities for Objects A and B?

What are TWO differences in the motion of
Objects A and B?

4. Given the Velocity vs. Time graph answer the following questions.



Describe the object's motion from t=0s to t=4s.
Describe the object's motion from t=4s to t=8s.

What is the acceleration of the object from
t=0s to t=4s? What is the acceleration of the
object from t=4s to t=8s?

Give one similarity and one difference in the
object's motion during t=0s to t=4s and t=4s to
t=8s.

PART 2-FORCES and NEWTON'S LAWS

Below are the forces & Newton's Laws of Motion learning targets that will be assessed on the semester one exam. Please identify your strengths & weaknesses in these areas so you can determine which areas you might need to review further.

2.1 What is a Force?

	<u>Assessment Statement</u>	I get it!	I need to review more
2.1.a	Define the units for Force.		
2.1.b	Describe a force as an interaction between two objects.		

2.2 Types of Forces

	<u>Assessment Statement</u>	I get it!	I need to review more
2.2.a	Identify the forces acting on an object.		
2.2.b	Define normal forces.		
2.2.c	Define friction force, kinetic friction, and static friction.		

2.3 Newton's Laws of Motion

	<u>Assessment Statement</u>	I get it!	I need to review more
2.3.a	Define and apply Newton's 1 st Law (including the property of inertia).		
2.3.b	Define and apply Newton's 2 nd Law.		
2.3.c	Define and apply Newton's 3 rd Law.		

5. Define/provide examples of/provide conditions for/describe applications of the following:
Force (w/units) -

Balanced Force -

Unbalanced Force -

Net Force -

Force diagram/Free body diagram -

Adding/Subtracting forces -

Friction -

Gravity/gravitational force -

Normal force -

Tension force -

Applied force -

Drag/air resistance -

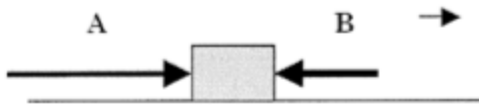
Inertia -

6. Force Diagrams:

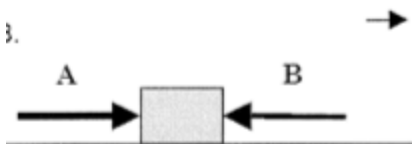
For each diagram below, the large arrows represent the forces and the small arrows (if any) represent the direction of motion. Circle the word balanced or unbalanced and then circle to indicate if the motion of the box is at constant velocity or accelerating.



Forces: *Balanced* *Unbalanced*
Motion: *Constant Velocity* *Accelerating*



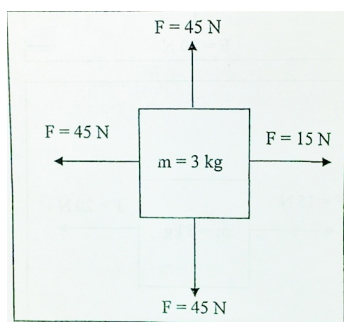
Forces: *Balanced* *Unbalanced*
Motion: *Constant Velocity* *Accelerating*



Forces: *Balanced* *Unbalanced*
Motion: *Constant Velocity* *Accelerating*

7. In the space to the right, draw and label the forces on a force diagram in the following situation in which Joe pushes a cabinet and it accelerating:

Joe pushing and cabinet moving

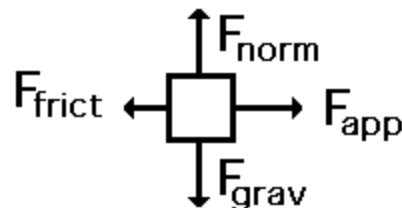


8. For the diagram to the left, identify the net force and the acceleration of the 3 kg object.

Net Force:

Acceleration:

9. For the diagram to the right, identify...
- which forces are balanced and which forces are unbalanced. How do you know from the diagram that there are balanced and unbalanced forces?



- if the object in the diagram (the box) is in motion? If yes describe its motion.

10. Describe and sketch a situation (w/ force diagram) in which forces are balanced, and an object is moving at a constant velocity.

Indicate which of Newton's Three Laws is best described in each of the following situations:

11. A diver dives forward off of a raft. The raft moves backward _____
12. You are standing on a bus moving down the street. The bus suddenly stops. You "fly" forward.

13. A gently tossed football travels slower than one that is strongly thrown

Force Calculations:

15. What is the mass of an object that requires 150 N of force to accelerate it at 30 m/s/s?
16. What is the acceleration of a 2500 kg truck if a force of 7500 N is applied?
17. How much force should a soccer player apply to cause 0.5 kg ball to accelerate at a rate of 20 m/s/s?

PART 3-ENERGY

Below are the energy learning targets that will be assessed on the semester one exam. Please identify your strengths & weaknesses in these areas so you can determine which areas you might need to review further.

3.1 Energy Conservation and Transfer

	<u>Assessment Statement</u>	I get it!	I need to review more
3.1.a	Identify that Joules is the unit of measure for energy.		
3.1.b	Define and apply the Law of Conservation of Energy.		

3.2 Mechanical Energy

	<u>Assessment Statement</u>	I get it!	I need to review more
3.2.a	Calculate kinetic energy.		
3.2.b	Calculate gravitational potential energy.		

3.3 Electrical Energy

	<u>Assessment Statement</u>	I get it!	I need to review more
3.3.a	Define electrical current and identify its units.		
3.3.b	Define voltage, identify its units, and how it relates to a battery.		
3.3.c	Define resistance and identify its units.		
3.3.d	Identify the relationship between current, voltage, and resistance.		

3.4 Work

	<u>Assessment Statement</u>	I get it!	I need to review more
3.4.a	Define work, both conceptually and algebraically.		

18. Define/provide examples of/provide conditions for/describe applications of the following:

Law of Conservation of Energy -

Joule -

Kinetic Energy [E_k] (w/formula) -

Gravitational Potential Energy [E_g] (w/formula) -

Mechanical Energy [EM] (w/ formula) -

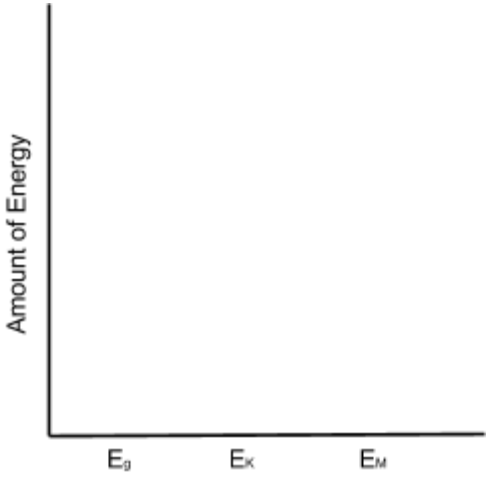
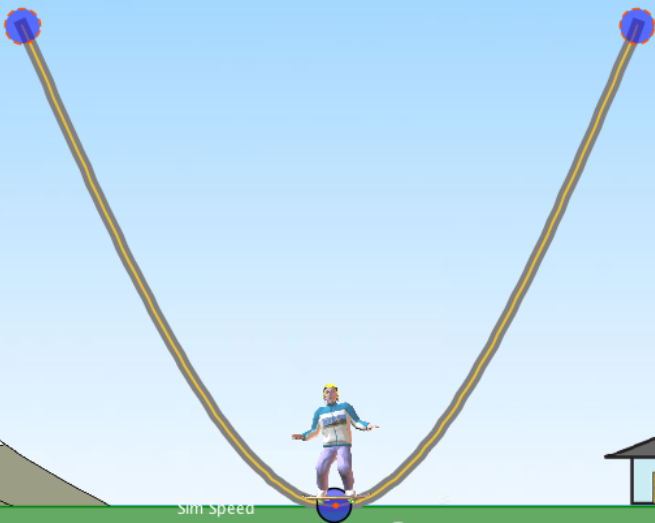
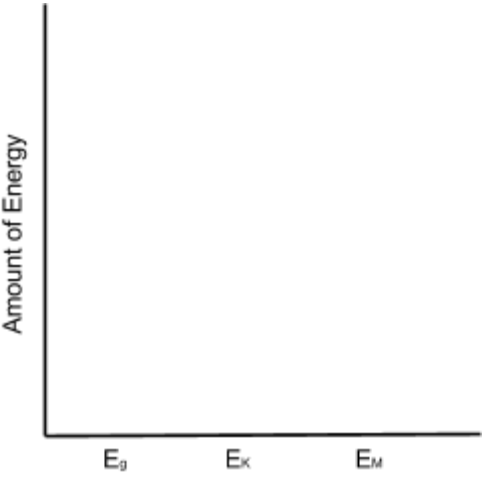
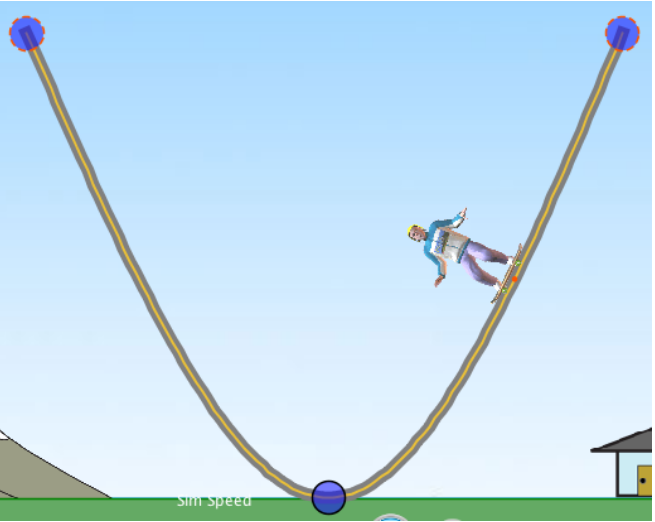
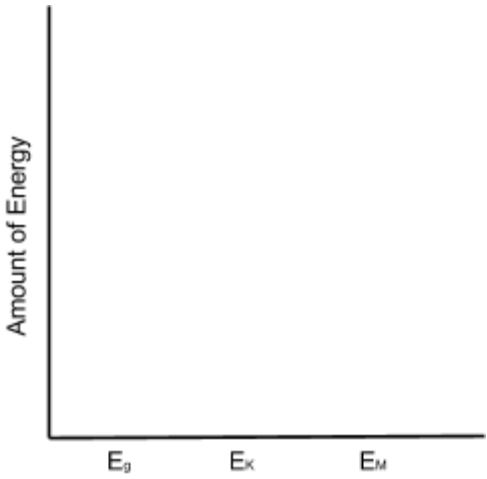
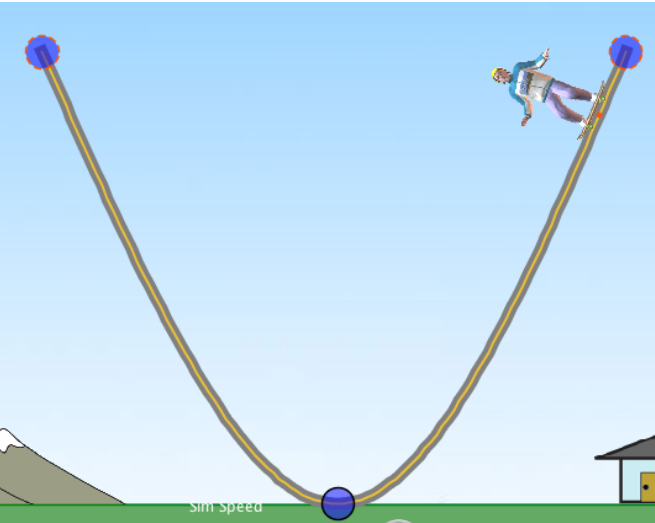
Current (w/units) -

Voltage (w/units) -

Resistance (w/units) -

Work (w/ formula & units) -

19. Given the following scenario, fill-in the energy bar charts for the skater's motion.



20. Determine the kinetic energy of a 625-kg roller coaster car that is moving with a speed of 18.3 m/s.

Known & Unknown Variables

Calculations (with units on ALL #'s)

Equation(s)/Formula(s) Used

Answer

21. A cart is loaded with a brick and pulled at constant speed along an incline to the height of 0.45 meters. If the mass of the loaded cart is 3.0 kg what is the gravitational potential energy of the loaded cart at the top of the incline?

Known & Unknown Variables

Calculations (with units on ALL #'s)

Equation(s)/Formula(s) Used

Answer

22. If a force of 14.7 N is used to drag the loaded cart (from Question 21) along the incline for a distance of 0.90 meters, then how much work is done on the loaded cart?

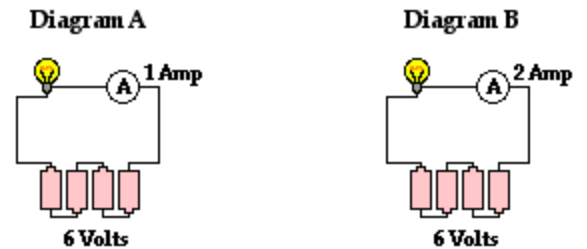
Known & Unknown Variables

Calculations (with units on ALL #'s)

Equation(s)/Formula(s) Used

Answer

23. The diagram below depicts a couple of circuits containing a voltage source (battery pack), a resistor (light bulb) and an ammeter (for measuring current). In which circuit does the light bulb have the greatest resistance? Why?



24. Which of the following will cause the current through an electrical circuit to decrease? Circle all that apply.
- ☐ decrease the voltage
 - ☐ decrease the resistance
 - ☐ increase the voltage
 - ☐ increase the resistance
25. A certain electrical circuit contains a battery with three cells, wires and a light bulb. Which of the following would cause the bulb to shine less brightly? Circle all that apply.
- ☐ increase the voltage of the battery (add another cell)
 - ☐ decrease the voltage of the battery (remove a cell)
 - ☐ decrease the resistance of the circuit
 - ☐ increase the resistance of the circuit

26. Read the following statements and determine whether or not they represent examples of work and then provide an explanation for your answer.

Scenario	Example of Work (Y/N)	EXPLANATION
A teacher applies a force to a wall and becomes exhausted.		
A book falls off a table and free falls to the ground.		
A waiter carries a tray full of meals above his head by one arm straight across the room. [Think only about the work of the server on the tray]		